Sunamganj Community Based Resource Management Project

Technical Evaluation of the Concrete Block Road Construction

1. Background :

An IFAD mission carried out supervision of the Sunamganj Community Based Resource Management Project from 2nd February to 14th February, 2008. One of the findings and recommendations given by the mission after the visit as contained in their Aidememoire is to carryout a Technical evaluation of the concrete block road system undertaken in the project. To fulfill the requirement Chief Engineer, LGED as per his memo no. LGED/PD/CBRMP/I-22/2008/773, dated: 01.04.2008 has constituted an Technical Evaluation Team for the evaluation of the work.

2. The Technical Evaluation Team

The Team consists of the following Technical Personnel :

Sl. No.	Name	Designation	Remarks
01.	Mr. Md. Mostadar Rahman	Bridge and Structural Engineer, Design Unit, LGED	Team Leader
02.	Mr. Md. Moksed Alam	SDS, RIIP-2, LGED	Member
03.	Mr. A.B.M. Nazrul Islam	SDS, Design Unit, LGED	Member
04.	Mr. Md. Zahedul Islam	AE, Design Unit, LGED	Member
05.	Mr. S.K. Md. Mohsin	PD, CBRMP, LGED	Member-Secretary

The Team undertook a field visit on April 25, 2008.

3. The Project :

A brief description of the project, its implementation arrangement, its main objectives along with components under the projects etc. were presented by the Project Director on 25th April, 2008 morning. A snap shot of the presentation is given below :

The project area comprises of all Upazilas of Sunamganj and the haor areas of Habiganj, Kishoreganj and Netrokona districts and the project period is 2002-03 to 2013-14 in three phases with an investment cost of total Tk. 4427 lakh funded by IFAD (Tk. 3422.61 lakh), GOB (Tk. 943.89 lakh) and Beneficiary participation (Tk. 60.50 lakh). The lead implementing agency is the LGED; other concerned Ministries/Organisations are Ministry of Land, Department of Agricultural Extension (DAE), Department of Livestock Services (DOLS), Department of Fisheries (DOF), Bangladesh Krishi Bank (BKB) and the Local Government Institutions, Upazila and Union Parishads.

The main objectives of the project are to improve the livelihoods of the rural poor by direct participation in the project implementation through skill development and optimum unitization of local resources and employment generation and thereby reduction of poverty.

The main components under the Project are :

- **Infrastructure Development**
  - To build village roads to connect the main road networks to install Tube-wells for supply of drinking water and to construct godowns for the storage of food grains.

- **Fisheries Development**
  - To excavate/re-excavate the beels, khals and ponds to create community based fish rearing areas, to establish sanctuaries for the conservation of mother fishes and to ensure expansion of pisciculture in the project area.

- **Agriculture and Livestock**
  - To promote livestock and crop production in the project area through demonstration, training and farmer field school approach.

- **Micro-Credit**
  - To create and train village organisations, Credit Organisations and to introduce a Credit System through Bangladesh Krishi Bank for agricultural production, Cattle rearing and dairy, small nursery, small scale industries etc.

- **Institutional Development**
  - To improve the management system for the formation of a sustainable organisation enabling expansion of the project.

4. **The Concrete Blocks :**

The Project Director further stressed on the introduction of the innovation using the concrete blocks in undertaking construction of village roads under the project which is the main point of interest to the Evaluation Team. Recently the project has started road construction by concrete blocks through Project Implementation Committees instead of reinforced concrete employing contractors. The advantages of the concrete blocks over the reinforced concrete, as envisaged, are :

- Total involvement of the Project Community Groups in Selection, Planning, Implementation, Monitoring and Maintenance of the road making it more labour intensive to the community

people as they were not involved in implementation when undertaken by the contractors. Quality of works are also better as those are implemented through community participation.

- Cost of construction is less due to omission of expensive reinforcing steel.

- Block making can be done over some time in advance of laying the road, allowing group members, especially the women, to fit this work as extra earning along with other household works. Employment generation for the women, as such, has been increased.

- As the block making technology along with its laying is simple, skilled manpower development is easier in this type of road construction.

- As the raw materials for block preparation are locally available stone/gravels and sands, extensive harnessing and use of local resources will be ensured.

- Concrete block preparation & their laying are acceptable options to the community people. In case of any subsidence its repair & maintenance is easier than that of a reinforced concrete road.

The Project Director informed that upto the end of February 2008, the project has built 90 roads adding upto about 100Km, connecting 180 villages in six Upazilas.

5. Field Visits :

The Team carried out a field visit on 25th April, 2008 to the road construction using the concrete blocks and talked to the community people, the beneficiaries, the Labour Contracting Societies (LCS), different field organisations in respect of activities undertaken by the project, their implications in employment generation and poverty reduction, limitations and suggestions in respect of further improvements. All the project personnel were present during the field visits.

6. Observations :

The Team observed the following roads under construction :

A. Road from Haluaghat to the End point of Monipur village

Type of the road is village road ? It is in Surma Union under Sadar Upazila and located on the bank of the river Surma. It starts near the market-Haluaghat and ends to Monipur village. Total length of the road, undertaken for development, is 1.00Km divided into 5 segments. Each segment having a length of 200m has been awarded to a LCS for its development.

There are 2 female and 3 male LCS groups each comprising of 30 members. Present width of the road crest is nearly 2.0m and height from the existing G.L. is nearly 1.0m. The road runs almost parallel to the high stream Surma river located nearly 50-100m away from the road alignment. Bank erosion at some places along the road is significant. The road runs through comparatively higher ground and generally it does not submerge under flood water.

Manufacturing of blocks for the edges and for the pavement at two segments have already been completed by two LCS groups one of which is female group. The groups have used the road side vacant land as a manufacturing yard to minimise cost of carrying and saving time for its implementation. As the community people are involved in the whole process of implementation the groups usually do not find any problem during construction. Raw materials like gravel and sand are collected locally by the local people creating employment. Quality of blocks appears to be good.

Box cutting, preparation of bed and installation of the blocks will be started very soon as reported by the LCS groups. While asking, the groups informed that they have acquired technical training from the project how to manufacture the concrete blocks and how to handle the whole process of road construction. The female LCS group further informed that the road construction has created more employment to them and it does not create any social conflict between their house-hold activities. Their family members are happy as they could earn more for their livelihood.

B. Road from Ampara Bazar to Purana Gudigaon Multipurpose village Centre (MVC) Ch. 600m-1500m.

Type of road is village road located in Jahangirnagar Union under Sadar Upazila. It originates from the Ampara Bazar (Market) and passes through the densely populated areas and almost flushed with the surrounding ground level. Except a few portions, almost everywhere it does not require any extra filling to raise the road level. Total length of the road is 900m divided into 9 segments; each segment has been constructed by a separate PIC. Construction of the road is already completed. The road after its construction, has not experienced any flood submergence, as reported by the Community People.

C. Road from Ampara Bazar to Purana Gudigaon Multipurpose village Centre (MVC) Ch. 1500m-1920m.

This is the continuation of the above road from Ch. 1500m to 1920m. Total length under construction is 420m and has been divided into two segments. This part of the road is also

almost flushed with the existing ground level. Manufacturing of the blocks, using the locally available natural resources like stone and sand, have already been started by the concerned LCS groups in the yards adjacent to the road alignment. Quality of blocks appears to be good. However bed preparation for laying the blocks on the road profile will be started as soon as possible after proper curing of the blocks, as reported by the LCS groups. In a discussion held in the MVC with the MCO & FCO during the field visit, the members expressed their full satisfaction with the road construction by CC blocks specially as the community people are involved from the very beginning of the selection process to the end of its implementation. However they commented that the present design width of the block paved road is inadequate to cross two rickshaws side by side and suggested to increase the width by at least one block i.e. 375mm.

7. **Specifications and Construction Procedure :**

- **Specifications :**

  The blocks are 375mm long, 225mm wide and 150mm deep and tapered towards the top Edes. Gaps between two blocks at top are filled with sand-cement mortar.

  Materials for the blocks are stone chips (20mm down graded) at good quality, sand (FM: 1.2-1.8) and Cement and the mix proportion is 1:2:4. The blocks should be properly cured by applying water.

- **Construction Procedure :**

  Depth of box cutting should be 175-225mm. 75mm sand filling of FM 0.5 (min.) should be done and the sand should be compacted manually (95% compaction) using durmus. Blocks should be placed properly so that there is no gap in between two blocks and the top tapered place should be filled up by sand-cement mortar. Along the long direction, on both sides of the road, edging blocks will be placed. After every 5.0m strip edging blocks will be placed cross-wise of the road. Earthen shoulder of width 450mm should be maintained on both sides of the road length. For the submersible road, size of the main blocks are same. But the edging blocks, to be provided along the road length, would be of greater length and depth and of variable width (100mm at top & 150mm at bottom) so that it penetrates more into the soil and prevents scouring of the road bed due to on rush of flood water. Off course construction of the submersible road has not been started till now. It is in the planning stage.

- **Quality Control :**

  In collaboration with LGED Upazila Engineer, the IMC is trained by the Project's Engineer in checking the quality of materials, concrete mixing processes, thickness of the concrete Block, and curing after casting. Two people from the IMC supervise construction activities and ensure the quality of work.

  As a pilot scheme a total of 4.5km of roads have been built using this approach, with most block making taking place in the September to November monga period when little other work is available.

- Cost per km of Block road construction for a width of 2m is 19.50 lacs & that of 3m width is 29.28 lacs.

8. **Evaluation of the Concrete Block Road :**

- **Road Traffic :**

  The roads used for concrete blocks are mostly village roads. Traffics plying on the roads are very light like cycle, cycle rickshaw, rickshaw-van, motor cycles etc. There is no motor cars or trucks in the vicinity at present During visit it was found that the rickshaw-vans are mostly carrying passengers, agricultural products and construction materials e.g. stone, sand, cement etc. Intensity and volume of those traffic movements are medium.

- **Condition of the block roads :**

  Construction of Block roads, in place of RCC pavements, is a very good innovation and good concept undertaken under the project. The technical specifications whole procedure of construction, quality control and other related aspects appeared to be technically sound and acceptable under the present environment. Employment generation & social acceptance of the block road is also very encouraging. Some of the points are noted below :

  Condition of the constructed block roads are good. No damage and settlement of the blocks were found during site visits. Off course the riding surfaces is not very comfortable due to presence of the joints around the blocks.

- **Conclusion :**

Construction of the Block roads are presently being undertaken mostly for the village roads where there is no significant traffic exerting harmful point load from the wheels. The selected roads are also situated comparatively on higher grounds where there is no significant submergence occurred during monsoon. As the blocks are rigidly joined each other with cement mortar, exertion of heavy loads may damage the joints as well as may settle the individual blocks making the road stretch a little bit unstable. In case of RCC pavement, due to monolithic characters of the road slab it could distribute the load to a greater area and hence check the settlement to a greater extent.

- **Recommendations :**

The committee recommends the following points :

- To ensure proper compaction to prevent any unevent settlement.

- Joints in between two blocks may be made flexible instead of rigid, as in the case of WBM road, to prevent cracking of the sand-cement mortar. In this case there should be a gap in between two blocks of say 6-10m.m.

- Width of the road may be increased by one block (375mm) as suggested by the beneficiaries to case crossing of two rickshaws.

- In case of submersible road 150m sand filling may be provided to prevent settlement of the blocks due to long submergence. To obtain better result compaction of the sand layer may be initiated using small vibratory rollers.

- Large investment specially in case of submersible road, should be done by undertaking a road stretch on trial.

- The behaviour of the block roads should be properly monitored after recession of the flood water and after that its replication to other areas/projects should be judged.

08.06.08

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